

Curriculum Vitae of Thomas Wies

Particulars

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Research Interests

Program analysis and verification; automated deduction; concurrent software; software productivity.

Education

- University of Freiburg, Freiburg, Germany, 2006 – 2009
Ph.D. in Computer Science (with distinction), degree date: November 2009
Thesis: Symbolic Shape Analysis, Advisor: Prof. Andreas Podelski
- Max Planck Institute for Computer Science, Saarbrücken, Germany, 2005 – 2006
Ph.D. student
- Saarland University, Saarbrücken, Germany, 1999 – 2005
B.Sc. and M.Sc. in Computer Science (Diplom), Minor in Physics, degree date: March 2005
Thesis: Symbolic Shape Analysis, Advisor: Prof. Andreas Podelski

Academic Honors and Awards

- Best Paper Award at OOPSLA 2014.
- National Science Foundation, CAREER Award, 2014.
- Ph.D. with distinction, University of Freiburg, 2009.
- Microsoft Research European Ph.D. Scholarship, 2006 – 2009.
- Scholarship of DFG Research Training Group on “Mathematical Logic and Applications”, University of Freiburg, 2006 – 2009.
- Scholarship of DFG Research Training Group on “Quality Guarantees for Computer Systems”, Max Planck Institute for Computer Science, 2005 – 2006.

Work Experience

- 2017 – today: Associate Professor. Computer Science Department, Courant Institute of Mathematical Sciences, New York University, New York, NY, USA.
- 2011 – 2017: Assistant Professor. Computer Science Department, Courant Institute of Mathematical Sciences, New York University, New York, NY, USA.
- 2016 (Summer): Visiting Researcher. Microsoft Research, Redmond, WA, USA.
- 2009 – 2011: Postdoctoral Researcher. Institute of Science and Technology, Klosterneuburg, Austria.
- 2008 – 2009: Postdoctoral Researcher. École Polytechnique Fédérale de Lausanne, Switzerland.
- 2007 (Fall): Research Intern. Microsoft Research, Redmond, WA, USA.
- 2006 (Fall): Research Intern. Microsoft Research, Cambridge, UK.
- 2006 – 2008: Research Assistant. University of Freiburg, Germany.
- 2005 – 2006: Research Assistant. Max Planck Institute for Computer Science, Saarbrücken, Germany.

Selected Invited Talks

- 16th International Workshop on Satisfiability Modulo Theories, Oxford, UK, July 2018.
- Shonan Meeting on “Analysis and Verification of Pointer Programs”, Shonan Village, Japan, October 2017.
- International Summer School on “Verification Technology, Systems & Applications”, Saarbrücken, Germany, August 2017.
- International Summer School on “Satisfiability, Satisfiability Modulo Theories, and Automated Reasoning”, Lisbon, Portugal, June 2016.
- Dagstuhl Seminar on “Verification of Evolving Graph Structures”, Dagstuhl, Germany, November 2015.
- 16th International Workshop on Verification of Infinite State Systems, New Delhi, India, December 2014.
- 15th International Conference on Verification, Model Checking, and Abstract Interpretation, San Diego, USA, January 2014.

Professional Activities

Grants

- T. Wies. SHF:Small:Verifying Complex Concurrent Data Structures with Flow Interfaces. National Science Foundation, CCF-1815633. Oct. 2018 – Sep. 2021. Total amount: \$498,496.00.
- E. Koskinen and T. Wies. CCF:Small:Collaborative: Concurrent Software Verification with Rely/Guarantee Abstractions. National Science Foundation, CCF-1618059. Aug. 2016 – Jul. 2019. Total amount: \$489,863.00 (NYU: \$240,252.00).
- M. Walfish, T. Wies, and A. Blumberg. TWC: Medium: Scaling proof-based verifiable computation. National Science Foundation, CNS-1514422. Jul. 2015 – Jun. 2019. Total amount: \$1,151,830.00.
- T. Wies. CAREER: Abstracting Programs for Automated Debugging. National Science Foundation, CCF-1350574. Feb. 2014 – Jan. 2019. Total amount: \$512,734.00.
- T. Wies and C. Barrett. SHF:Small:Integrating separation logic and SMT for better heap verification. National Science Foundation, CCF-1320583. Sep. 2013 – Aug. 2017. Total amount: \$500,000.00.

Organizer and Program Chair

- Chair of 8th Workshop on Tools for Automatic Program Analysis, *TAPAS 2017*, New York, NY, USA, August 2017.
- Co-Chair of 9th Working Conference on Verified Software: Theories, Tools, and Experiments, *VSTTE 2017*, Heidelberg, Germany, July 2017.
- Co-Chair of 4th International Workshop on Invariant Generation, *WING 2012*, Manchester, UK, June 2012.

Program Committee Member

Conferences:

- 10th Working Conference on Verified Software: Theories, Tools, and Experiments, *VSTTE 2018*, Oxford, UK, July 2018.
- 30th International Conference on Computer Aided Verification, *CAV 2018*, Oxford, UK, July 2018.
- 24th International Conference on Tools and Algorithms for Construction and Analysis of Systems, *TACAS 2018*, Thessaloniki, Greece, April 2018.
- 19th International Conference on Verification, Model Checking, and Abstract Interpretation, *VMCAI 2018*, Los Angeles, CA, USA, January 2018.
- *Onward! 2017*, Vancouver, Canada, October 2017.
- 28th International Conference on Concurrency Theory, *CONCUR 2017*, Berlin, Germany, September 2017.
- 31st European Conference on Object-Oriented Programming, *ECOOP 2017*, Barcelona, Spain, June 2017.
- 23rd International Conference on Tools and Algorithms for Construction and Analysis of Systems, *TACAS 2017*, Uppsala, Sweden, April 2017.
- 28th International Conference on Computer Aided Verification, *CAV 2016*, July 2016, Toronto, Ontario, Canada.
- 43th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, *POPL 2016*, Extended Reviewer Committee, St. Petersburg, FL, USA, January 2016.

- 17th International Conference on Verification, Model Checking, and Abstract Interpretation, *VMCAI 2016*, St. Petersburg, FL, USA, January 2016.
- 16th International Conference on Verification, Model Checking, and Abstract Interpretation, *VMCAI 2015*, Mumbai, India, January 2015.
- 41th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, *POPL 2014*, San Diego, USA, January 2014.
- 5th International Conference on Verified Software: Theories, Tools, and Experiments, *VSTTE 2013*, Atherton, USA, May 2013.
- 19th International Static Analysis Symposium, *SAS 2012*, Deauville, France, September 2012.
- 4th International Conference on Verified Software: Theories, Tools, and Experiments, *VSTTE 2012*, Philadelphia, USA, January 2012.

Workshops:

- 1st Workshop on Automated Deduction for Separation Logics, *ADSL 2018*, Oxford, UK, July, 2018.
- 2nd International Workshop on Causal Reasoning for Embedded and Safety-critical Systems Technologies, *CREST 2017*, Uppsala, Sweden, April, 2017.
- 14th International Workshop on Satisfiability Modulo Theories, *SMT 2016*, Coimbra, Portugal, July 2016.
- 21st Workshop on Foundations of Object-Oriented Languages, *FOOL 2014*, Portland, USA, October 2014.
- 12th International Workshop on Satisfiability Modulo Theories, *SMT 2014*, Vienna, Austria, July 2014.
- 14th Workshop on Formal Techniques for Java-like Programs, *FTfJP 2012*, Beijing, China, June 12, 2012.
- 2nd International Workshop on Intermediate Verification Languages, *BOOGIE 2012*, Berkeley, California, USA; July 2012.
- 3rd International Workshop on Invariant Generation, *WING 2010*, Edinburgh, UK, July 2010.
- 2nd International Workshop on Invariant Generation, *WING 2009*, York, UK, March 2009.

Refereed for

- **Book chapters:** Handbook of Model Checking.
- **Journals:** Transactions for Programming Languages and Systems (*TOPLAS*); Computing Surveys (*CSUR*); Formal Methods in System Design (*FMSD*); Journal of Automated Reasoning (*JAR*); Journal of Symbolic Computation (*JSC*); Logical Methods in Computer Science (*LMCS*); Journal of Functional Programming (*JFP*); Journal of Computer Science and Technology (*JCST*); Acta Informatica; ACM Transactions on Design Automation of Electronic Systems (*TODAES*); Computer Languages, Systems & Structures (*COMLAN*); Science of Computer Programming (*SCICO*); Transactions on Software Engineering (*TSE*).
- **Conferences:** Static Analysis Symposium (*SAS*): 2004–2007, 2009–2012; Verification, Model Checking, and Abstract Interpretation (*VMCAI*): 2005, 2006, 2008, 2014–2016, 2018; Conference on Automated Deduction (*CADE-20*); ACM Symposium on Principles of Programming Languages (*POPL*): 2006, 2010, 2013, 2014, 2016, 2017, 2018; Logic for Programming, Artificial Intelligence, and Reasoning (*LPAR*): 2006, 2012; Conference on Tools and Algorithms for the Construction and Analysis of Systems (*TACAS*): 2007, 2009, 2015, 2018; Conference on Computer Aided Verification (*CAV*): 2008, 2009, 2016, 2018; Asian Semantic Web Conference (*ASWC*): 2008; Compiler Construction (*CC*): 2009, European Symposium on Programming (*ESOP*): 2010, 2015. Foundations of Software Science and Computation Structures (*FOSSACS*): 2011, 2013; Programming Language Design and Implementation (*PLDI*): 2011, 2014, 2015, 2016; Runtime Verification (*RV*): 2011, 2012. Verified Software: Theories, Tools, and Experiments (*VSTTE*): 2012, 2013, 2017, 2018; Automated Technology for Verification and Analysis (*ATVA*): 2012. NASA Formal Methods Symposium (*NFM*): 2013. Computer Science Logic (*CSL*): 2013, 2018. Symposium on Frontiers of Combining Systems (*FroCoS*): 2013. Logic in Computer Science (*LICS*): 2015. International Joint Conference on Automated Reasoning (*IJCAR*): 2016, 2018. Annual Conference on Foundations of Software Technology and Theoretical Computer Science (*FSTTCS*): 2016.
- **Other:** National Science Foundation: 2014, 2016, 2017; Swiss Science Foundation; Czech Science Foundation.

Courses designed and taught

- “Object-Oriented Programming”, graduate course, NYU, Spring 2018.
- “Object-Oriented Programming”, undergraduate course, NYU, Fall 2013, Spring 2017, Fall 2017.
- “Principles of Programming Languages”, undergraduate course, NYU, Spring 2015, Fall 2015, and 2016.
- “Programming Paradigms for Concurrency”, graduate course, NYU, Spring 2014.
- “Rigorous Software Development”, graduate course, NYU, Spring 2012, 2013, and 2016.
- “Programming Languages”, graduate course, NYU, Fall 2012.

Advised Postdoctoral Fellows

- Yan Shvartzshnaider, NYU, January 2017 – today.
- Daniel Schwartz-Narbonne, NYU, January 2013 – May 2015.

Advised Students

current PhD students:

- Siddharth Krishna, NYU, 2013 – today.
- Zvonimir Pavlinovic, NYU, 2013 – today.

current undergraduate student:

- Goktug Saatcioglu, NYU, 2018 – today.

former PhD students:

- Kshitij Bansal (co-advised by Clark Barrett), NYU, 2013 – 2016, graduated on “Decision Procedures for Finite Sets with Cardinality, and Local Theory Extensions”.
- Chanseok Oh, NYU, 2014 – 2016, graduated on “Improving SAT Solvers by Exploiting Empirical Characteristics of CDCL”.
- Wei Wang (co-advised by Clark Barrett), NYU, 2013 – 2016, graduated on “Partition Memory Models in Program Analysis”.
- Paul Gazzillo (co-advised by Robert Grimm), NYU, 2014 – 2015, graduated on “Analyzing Source Code Across Static Conditionals”.
- Damien Zufferey, IST Austria, 2009 – 2011, graduated 2013 on “Analysis of Dynamic Message Passing Programs”.

former Master students:

- Damien Zufferey, EPFL, graduated 2009 on “Verification of Concurrent Asynchronous Message- Passing Programs”.
- Marco Muñoz, Freiburg University, graduated 2009 on “Decision Procedures for List-Manipulating Programs”.

former undergraduate students:

- Ariel Holtzman, NYU, Summer 2015.

Doctoral Thesis Committee Member

- Junjie Chen, “SMT-Based and Disjunctive Relational Abstract Domains for Static Analysis”, NYU 2015, (Advisor: Patrick Cousot).
- Liana Hadarean, “Efficient and Trustworthy Theory Solver for Bit-vectors in Satisfiability Modulo Theories”, NYU 2014, (Advisor: Clark Barrett).
- Tim King, “Effective Algorithms for the Satisfiability of Quantifier-Free Formulas Over Linear Real and Integer Arithmetic”, NYU 2014 (Advisor: Clark Barrett).
- Alex Rubinsteyn, “Runtime Compilation of Array-Oriented Python Programs”, NYU 2013 (Advisor: Dennis Shasha).
- Eric Hielscher, “Locality Optimization For Data Parallel Programs”, NYU 2013 (Advisor: Dennis Shasha).
- Dejan Jovanović, “SMT Beyond DPLL(T): A New Approach to Theory Solvers and Theory Combination”, NYU 2012 (Advisor: Clark Barrett).

NYU Computer Science Department

- Member of CS Appointments Committee, 2017 – today.
- Member of CS Fellowship Committee (admission, student progress), 2013 – today.
- Organizer of Ph.D. student visit day, 2012 – today.

Professional Memberships

- Association for Computing Machinery (ACM SIGPLAN)

Languages

German, English, French (basic knowledge).

Publication List

1. Go with the Flow: Compositional Abstractions for Concurrent Data Structures. S. Krishna, D. Shasha, T. Wies. In *Proceedings of the ACM on Programming Languages, Vol. 2, No. POPL, Article 37*, January 2018.
2. Full Accounting for Verifiable Outsourcing. R. S. Wahby, Y. Ji, A. J. Blumberg, a. shelat, J. Thaler, M. Walfish, T. Wies. In *ACM Conference on Computer and Communications Security, CCS*, Dallas, TX, USA, November 2017.
3. Partitioned Memory Models for Program Analysis. W. Wang, C. Barrett, and T. Wies. In *18 International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI 2017*, Paris, France, January 2017.
4. Error Invariants for Concurrent Traces. A. Holzer, D. Schwartz-Narbonne, M. Tabaei Befrouei, G. Weissenbacher and T. Wies. In *21st International Symposium on Formal Methods, FM'16*, Limassol, Cyprus, November 2016.
5. Learning Privacy Expectations by Crowdsourcing Contextual Informational Norms. Y. Shvartzshnaider, S. Tong, T. Wies, P. Kift, H. Nissenbaum, L. Subramanin, and P. Mittal In *AAAI Conference on Human Computation and Crowdsourcing, HCOMP'16*, Austin, TX, USA, October 2016.
6. Classifying Bugs with Interpolants. A. Podelski, M. Schäf, and T. Wies. In *10th International Conference on Tests & Proofs, TAP'16*, Vienna, Austria, July 2016.
7. Complete Instantiation-Based Interpolation. N. Totla and T. Wies. In *Journal of Automated Reasoning*, 57(1):37-65, 2016.
8. Practical SMT-Based Type Error Localization. Z. Pavlinovic, T. King, and T. Wies. In *20th ACM SIGPLAN International Conference on Functional Programming, ICFP'15*, Vancouver, British Columbia, Canada, August 2015.
9. Deciding Local Theory Extensions via E-Matching. K. Bansal, T. King, A. Reynolds, C. Barrett, and T. Wies. In *27th International Conference on Computer Aided Verification, CAV'15*, San Francisco, CA, USA, July 2015.
10. VERMEER: A Tool for Tracing and Explaining Faulty C Programs. D. Schwartz-Narbonne, C. Oh, M. Schäf, and T. Wies. In *37th International Conference on Software Engineering, ICSE'15, Demonstrations Track*, Florence, Italy, May 2015
11. Context-Directed Graph Coverage. D. Schwartz-Narbonne, M. Schäf, D. Jovanović, P. Rümmer, and T. Wies. In *7th NASA Formal Methods Symposium, NFM'15*, Pasadena, CA, USA, April 2015
12. Finding Minimum Type Error Sources. Z. Pavlinovic, T. King, and T. Wies. In *ACM SIGPLAN International Conference on Object Oriented Programming Systems, Languages, and Applications, OOPSLA'14*, Portland, OR, USA, October 2014.
13. Concolic Fault Abstraction. C. Oh, M. Schäf, D. Schwartz-Narbonne, and T. Wies. In *14th IEEE International Working Conference on Source Code Analysis and Manipulation, SCAM'14*, Victoria, Canada, September 2014.
14. Automating Separation Logic with Trees and Data. R. Piskac, T. Wies, and D. Zufferey. In *26th International Conference on Automated Verification, CAV'14*, Vienna, Austria, July 2014.
15. GRASShopper: Complete Heap Verification with Mixed Specifications. R. Piskac, T. Wies, and D. Zufferey. In *20th International Conference on Tools and Algorithms for the Construction and Analysis of Systems, TACAS'14*, Grenoble, France, April 2014.
16. Dynamic Package Interfaces. S. Esmailsabzali, R. Majumdar, T. Wies, and D. Zufferey. In *17th International Conference on Fundamental Approaches to Software Engineering, FASE'14*, Grenoble, France, April 2014.
17. Cascade 2.0. W. Wang, C. Barrett, and T. Wies. In *15th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'14*, San Diego, CA, USA, January 2014.
18. Explaining Inconsistent Code. M. Schäf, D. Schwartz-Narbonne, and T. Wies. In *9th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, ESEC/FSE'13*, Saint Petersburg, Russia, August 2013.
19. Automating Separation Logic using SMT. R. Piskac, T. Wies, and D. Zufferey. In *25th International Conference on Automated Verification, CAV'13*, Saint Petersburg, Russia, July 2013.
20. Structural Counter Abstraction. K. Bansal, E. Koskinen, T. Wies, and D. Zufferey. In *19th International Conference on Tools and Algorithms for the Construction and Analysis of Systems, TACAS'13*, Rome, Italy, March 2013.
21. Complete Instantiation-Based Interpolation. N. Totla and T. Wies. In *40th Annual ACM Symposium on the Principles of Programming Languages, POPL'13*, Rome, Italy, January 2013.
22. Flow-Sensitive Fault Localization. J. Christ, E. Ermis, M. Schäf, and T. Wies. In *14th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'13*, Rome, Italy, January 2013.

23. Error Invariants. E. Ermis, M. Schäfer, and T. Wies. In *18th International Symposium on Formal Methods, FM'12*, Paris, France, August 2012.
24. Ideal Abstractions for Well-Structured Transition Systems. D. Zufferey, T. Wies, and T. A. Henzinger. In *13th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'12*, Philadelphia, USA, January 2012.
25. Deciding Functional Lists with Sublist Sets. T. Wies, M. Muñoz, and V. Kuncak. In *4th International Conference on Verified Software: Theories, Tools, and Experiments, VSTTE'12*, Philadelphia, USA, January 2012.
26. An Efficient Decision Procedure for Imperative Tree Data Structures. T. Wies, M. Muñoz, and V. Kuncak. In *23rd International Conference on Automated Deduction, CADE-23*, Wrocław, Poland, August 2011.
27. Scheduling Large Jobs by Abstraction Refinement. T. A. Henzinger, V. Singh, T. Wies, and D. Zufferey. In *6th European Conference on Computer Systems, EuroSys'11*, Salzburg, Austria, April 2011.
28. Decision Procedures for Automating Termination Proofs. R. Piskac and T. Wies. In *12th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'11*, Austin, TX, USA, January 2011.
29. Doomed Program Points. J. Hoenicke, K. R. M. Leino, A. Podelski, M. Schäfer, and T. Wies. *Formal Methods in System Design (FMSD)*. 37(2):171, 2010.
30. A Marketplace for Cloud Resources. T. A. Henzinger, V. Singh, A. Tomar, T. Wies, and D. Zufferey. In *10th International Conference on Embedded Software, EMSOFT'10*, Scottsdale, AZ, USA, October 2010.
31. FlexPRICE: Flexible Provisioning of Resources in a Cloud Environment. T. A. Henzinger, V. Singh, A. Tomar, T. Wies, and D. Zufferey. In *3rd IEEE International Conference on Cloud Computing, CLOUD'10*, Miami, FL, USA, July 2010.
32. Forward Analysis of Depth-Bounded Processes. T. Wies, D. Zufferey, and T. A. Henzinger. In *13th International Conference on Foundations of Software Science and Computation Structures, FoSSaCS'10*, Paphos, Cyprus, March 2010.
33. Counterexample-Guided Focus. A. Podelski and T. Wies. In *37th Annual ACM Symposium on the Principles of Programming Languages, POPL'10*, Madrid, Spain, January 2010.
34. Building a Calculus of Data Structures. V. Kuncak, R. Piskac, P. Suter, and T. Wies. In *11th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'10*, Madrid, Spain, January 2010.
35. It's doomed; we can prove it. J. Hoenicke, K. R. M. Leino, A. Podelski, and M. Schäfer, and T. Wies. In *16th International Symposium on Formal Methods, FM'09*, Eindhoven, Netherlands, November 2009.
36. Combining Theories with Shared Set Operations. T. Wies, R. Piskac, V. Kuncak. In *7th International Symposium on Frontiers of Combining Systems, FroCoS'09*, Trento, Italy, September 2009.
37. Abstraction Refinement for Quantified Array Assertions. M. N. Seghir, A. Podelski, and T. Wies. In *16th International Static Analysis Symposium, SAS'09*, Los Angeles, CA, USA, August 2009.
38. Intra-Module Inference. S. K. Lahiri, S. Qadeer, J. P. Galeotti, J. W. Vong, and T. Wies. In *21st International Conference on Computer Aided Verification, CAV'09*, Grenoble, France, July 2009.
39. Symbolic Shape Analysis. T. Wies. Ph.D. thesis, Freiburg University, Freiburg, Germany, January 2009.
40. Heap Assumptions on Demand. A. Podelski, A. Rybalchenko, and T. Wies. In *20th International Conference on Computer Aided Verification, CAV'08*, Princeton, NJ, USA, July 2008.
41. Shape Analysis for Composite Data Structures. J. Berdine, C. Calcagno, B. Cook, D. Distefano, P. W. O'Hearn, T. Wies, and H. Yang. In *19th International Conference on Computer Aided Verification, CAV'07*, Berlin, Germany, July 2007.
42. Using First-Order Theorem Provers in the Jahob Data Structure Verification System. C. Bouillaguet, V. Kuncak, T. Wies, K. Zee, and M. Rinard. In *8th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'07*, Nice, France, January 2007.
43. Field Constraint Analysis. T. Wies, V. Kuncak, P. Lam, A. Podelski, and M. Rinard. In *7th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI'06*, Charleston, SC, USA, January 2006.
44. Boolean Heaps. A. Podelski and T. Wies. In *12th International Static Analysis Symposium, SAS'05*, London, UK, September 2005.